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TRAUMATIC SYNOVITIS OF KNEE-JOINT WITH HEMORRHAGE INTO JOINT CAVITY—FOUR OUNCES OF BLOOD ENCAPSULED SIXTEEN MONTHS.

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LADIES AND GENTLEMEN: The patient before you, Mr. B., is 20 years of age, weighs 160 pounds, measures 5 feet 8 inches in height, has a finely-developed muscular system, is well-proportioned—in fact, you may recognize in him the form of an amateur athlete. Has never been sick. Family record perfect. None of his ancestors or relatives ever had consumption, so far as known. Claims to have lived a virtuous life. Is perfectly healthy aside from this local trouble, for the relief of which he came here. Sixteen months ago he fell a distance of one yard from a "running ladder" in a gymnasium, lighting squarely upon both feet. He at once felt a slight pain in the left knee, which was almost instantaneously followed by swelling. The gentleman paid no attention to it, but continued climbing and running about the mountains of Colorado. Last June the joint began to hurt him more than usual while walking, obliging him to resort to the use of crutches. It is greatly swollen. There is evidently considerable fluid in the joint, and the capsule is very much thickened. You may each of you examine this knee before it is prepared for the aspirator.

These enlarged and bulging knee-joints are popularly known as "white swellings." As they have been frequently found in girls who scrub floors, thus exposing their knees to dampness and the irritating pressure against hard substances, as floors and stairs, of wood or stone, they were named "house-maids' knees"; but that they are not limited to this class is thoroughly demonstrated in the clinics and

hospitals all over the civilized world. These cases until recently were embraced under the one name "Tumor Albus." The extraordinary advancement in the acquirement of pathological knowledge during the past twenty years has revolutionized the nomenclature and classification of surgical diseases, based upon etiology, pathological conditions and changes in their progress, so that at the present time we find joint inflammation can be placed under four general divisions: 1. Tubercular Arthritis; 2, Traumatic Arthritis; 3, Specific Arthritis; 4, Metastatic Arthritis. The first variety is by far the most numerous. It is claimed by prominent surgeons abroad that 90 per cent. of knee-joint inflammations presenting at their clinics are of tubercular origin. This seems a high estimate, and would assuredly be too high for America. We must, however, remember that the subjects of European clinics are generally very poorly nourished, and are much more crowded together than in our country. They are thus compelled to breathe a vitiated atmosphere, and are exposed in a greater degree to contagion. Although tubercular knee-joints are proportionately fewer, numerically they are far in excess of all other divisions with us, and therefore when a diseased knee-joint comes to us for treatment it has become the universal rule to think of tuberculosis at once, unless the evidence of traumatism or other cause is present. This being the case, it becomes necessary for the surgeon to keep clearly in mind the symptoms, not only of tuberculosis in general, but also the symptoms and signs of special forms of tubercular knee-inflammations, some of which in various points resemble the other divisions. Attempts have been made to classify tubercular joints, based upon pathological appearance of the joint tissues. A classification which has been received favorably by some surgeons is that of Hueter, as follows:

a. Synovitis Hyperplastica Pannosa.
b. " " Granulosa.
c. " " Tuberosa.

Besides these three we meet with

1. Diffuse Miliary Tuberculosis, accompanied by
2. Hydrops Tuberculosis, and another form known as
3. Empyaema.

The origin of the so-called classes, of course, in every instance is traced to the Tubercular Bacillus.

In diffuse miliary tuberculosis the tubercles are generally located in the subserous tissue, but they are sometimes found upon the tunica intima. This variety is accompanied by more or less hydrops, and aside from the swelling gives rise to the least degree of deformity. It is, however, accompanied by thickening of the capsule. The first and second varieties of Hueter are similar, differing only in extent of pathological growth. They are known under the head of fungous arthritis. The first—*Synovitis Hyperplastica Pannosa*--presents few fungi arranged in the form of a pannus, growing over the articular synovial surface from its border inwards; while in the second class *Synovitis Hyperplastica Granulosa*, the granulations are frequently spread all over the synovial surface. In both the capsule is thickened and considerably softened. These are liable after a time to be accompanied with a great deal of deformity, as flexion, rotation, and abduction of the tibia; still later backward dislocation and ankylosis.

Synovitis Hyperplastica Tuberosa differs so markedly from the others that there can be no error in diagnosis *after opening the joint;* and in fact one can not *positively* differentiate varieties without either aspirating or making an exploratory incision. Ocular or digital examination of the interior of the joint cavity, in many instances, will enable the surgeon to classify the case accurately. Synovitis Tuberosa is characterized by the presence of large fringe-like bodies projecting into the synovial cavity from various points of its circumference. These bodies vary greatly in numbers and size; occasionally they appear like tumors as large as walnuts, very irregular in outline, and might be mistaken for a lipoma, fibroma, or even a sarcoma. Several years ago I saw the entire surface of a synovial membrane of a knee-joint completely covered with fringe-like processes growing as closely together as the grass on a lawn; they were shaped like melon seeds and their average length was almost a centimeter. The joint was greatly enlarged; it bulged irregularly and presented a boggy feeling. The fringes arise from

the subserous tissue, and as they project into the joint cavity are covered by the tunica intima.

Tubercular Empyaema is accompanied by fluctuation. It is the natural sequence of the various forms of tuberculosis already described, and more especially of the granulating varieties, and is the result of caseous degeneration of the tubercles, consisting of the liquified caseous matter, with the accompanying products of coagulative necrosis and shreds of lymph. *Hydrops* is liable to accompany all forms of tuberculosis, but is frequently absent in the granulating varieties. Floating bodies shaped like melon seeds are sometimes found in the joint cavities. They consist possibly of one of the fringes of tuberculosis tuberosa or of a piece of exudative tissue broken off from the synovia. They are called rice bodies.

Before venturing a diagnosis in the present case it may be well to pass briefly in review other divisions of knee-joint inflammation.

Traumatic: The chronic traumatic inflammation of the knee-joint is also accompanied by thickening of the capsule, with great swelling and fluctuation.

The thickened capsule feels firmer to the touch, having been caused by the accumulation of a plastic exudate. It can frequently be reduced with the exhibition of alterative treatment. It has generally been preceded by a distinct injury, which the patient may recall. In children we can not always elicit the information. Sometimes the disease is gradually developed by the patient's occupation, by intermittent, or by a more or less constant, strain upon the joint. I can recall a number of such cases in my practice having occurred in stone masons, machinists, and laborers who had to do heavy lifting or who carried burdens up stairs, thus straining their knees, causing a subacute inflammation which finally led to a thickening of the capsule and paracapsular tissues. Rest and administration of iodide of potassium, with, in some cases, extension and elastic compression, affords relief, while change of employment prevents a return of the inflammation. If neglected, many of them progress until extreme deformity occurs; they now resemble more strongly the granulating tubercular disease in the last

stage, presenting rotation, flexion, abduction and backward subluxation, with ankylosis.

This condition, it has been claimed, is brought about occasionally by the extension of the inflammatory process into the upper extremity of the tibia, causing osteoporosis, the lower portion of the tibia remaining sound, the bone bends at the epiphyseal line, simulating in appearance a sub-luxation. Generally, however, the tibia is carried backwards, because this position is the most comfortable and because the action of the flexor muscles is stronger than those of extension.

The other divisions of knee-joint inflammation can be recognized by a careful study of their history, by a close investigation of local conditions, and by aspiration or exploratory incision if necessary. We will not have time during this brief clinic hour to go into details concerning them, but will hastily refer to their salient points in our efforts at making a differential diagnosis of the case in hand.

Our patient has a swollen knee joint; the depressions normally present at the side and below the patella are lost and there is a general rotundity at the knee. There is also a bulging at either side of the extensor tendon above the patella. We elicit fluctuation. The knee-joint is loose, the movements are too free. He can flex and extend the leg, but has no confidence in the joint while walking. The bones wabble at the articulation. The extended position gives him pain in the flexor, or hamstring, muscles of the thigh. They are slightly contractured. Striking the ends of the femur and tibia together gives slight pain. Extension makes the joint feel quite comfortable, showing that the crucial ligaments are not injured. Pressure upon the outer head of the tibia over the coronary ligament and semilunar cartilage causes him to wince. There is local tenderness here. He says it hurts. This is a common location for pain in knee-joint inflammations, and is attributed to the extra pressure caused over the semilunar cartilage at this point by the powerful action of the biceps muscle, which is greater than that of the inner hamstring muscles. They do not exert their entire force upon one point, thus more attrition and direct pressure

are brought to bear upon this cartilage and the bone beneath it.

You have heard the history of the case and you have examined the knee. What is your diagnosis? Some one said Traumatic Synovitis. The probabilities are that you are correct. Still we must not say positively that it is Traumatic Synovitis until we have eliminated the probability of anything else, and can show reasonable cause for believing that we are correct. What must we differentiate it from? All joint disease accompanied by swelling, with fluctuation. Tubercular Hydrops, Tubercular Empyaema, Syphilis, Gonorrhæal and Metastatic Inflammation, Ecchinococcus, and Popliteal Cyst.

Differential Diagnosis: Tuberculosis:—heredity; symptoms of tuberculosis in other tissues of the body; thickening of capsule and paracapsular tissues; pain slight; absence of traumatism; usually involving at the beginning a single joint, later sometimes several joints. Aspiration yielding a milky fluid with shreds or flakes of lymph; in the early stage of diffuse tubercular hydrops a clear serum; and in tubercular empyaema the products of caseous degeneration, with results of coagulative necrosis, shreds of lymph and at times blood. Exploratory incision presents to view the granulating surface, with softened capsule or fringe-like processes. Microscopically tubercles and sometimes bacilli may be seen.

Traumatism: Record of injury; absence of tubercular, or specific history. Pain may be slight or severe. Capsule and surrounding tissues thickened and firmer than in tuberculosis. Aspiration yields serum, blood and lymph shreds, and, if supuration has occurred, pus.

Rheumatism: More frequently involves several joints, occasionally only one. Rheumatic history. Pain severe; exacerbations accompanied by fever; frequently leaves one joint and attacks another. Perspiration and urine are acid. Yields to anti-rheumatic treatment.

Syphilis: History of primary and secondary lesions. Hereditary or acquired. Yields to alteratives. Aching pain.

Gonorrhœa: Preceding local affection. Rapid ankylosis.

Popliteal Cyst; Located on flexed side of joint; presents a tumor-like projection.

Ecchinococcus: Fluctuation. Aspiration yields hooklets recognized with microscope. Absence of history of other diseases.

Metastatic: Suppurative processes in other tissues. Fluctuation; intense pain. Aspiration brings pus.

In the present case, were we to make a diagnosis without further examination, it would be based upon the absence of a history of hereditary or acquired tuberculosis or syphilis, with a history of traumatism. This will not of itself suffice; the crucial test must be resorted to. I will therefore aspirate. In doing so we must be careful not to introduce air or any septic substance into the joint. Patient has been prepared antiseptically. After piercing the skin with the aseptic needle at the outer side of the extensor tendon, I draw it down a little with the needle and then puncture the capsule at a distance from the skin puncture. You now see a red fluid run into the bottle. The swelling has partially disappeared, but the joint yet looks considerably larger than its fellow. By taking hold of the paracapsular tissues I find that they are very much thickened and firm—a condition in all probability caused by plastic inflammation. Four ounces of thick blood have been taken from the joint cavity. The blood remained in the liquid state because it was encapsuled. The joint evidently was injured about the head of the tibia, and the hemorrhage may have occurred at different times. The diagnosis is Traumatic Synovitis, with hemorrhageinto the joint cavity.

The patient will be kept at rest. The opening produced with the needle in the capsule is first closed by the skin sliding back over it; the skin opening is sealed with a little cotton covered with collodion. The leg will remain in a trough splint until the wound is healed; then it will be taken out and an elastic compress consisting of a rubber bandage will be wrapped about the knee to hasten absorption of the exudate. Potassium Iodide will be administered to aid in the process. We will keep you informed of the progress of our case, and in a few days report the result of the examination of the fluid.

Microscopical Examination.—The fluid consisted of pure blood. Corpuscular elements were extraordinarily numerous, owing to the absorption of much of the serum. 582 Washington Boulevard.